

**Objective and Subjective Barriers to Physical Exercise for University Students**

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Objective and Subjective Barriers to Physical Exercise for University Students

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### **Executive Summary**

In this study, we investigated whether the likelihood for University of British Columbia (UBC) students to meet the Public Health Agency of Canada's (PHAC) recommended physical activity guideline of 150 minutes of moderate to strenuous exercise per week was impacted by their commuting demands, course load and access to fitness facilities. Data was collected through convenience sampling on campus, with a self-report questionnaire administered on iPads. Participants' objective and subjective barriers to exercise were both measured through the questionnaire. Results indicate that not only are UBC students not meeting the fitness guidelines, but also that they are subjectively attributing their lack of exercise to their course load. However, in regards to objective measures, we did not find any significant correlations between students' course load or commuting demands and their level of physical exercise. This suggests that students are overestimating how much course load influences their exercise. We did, however, find a significant positive correlation between the cost students are paying for their fitness facilities and their total exercise time. Physical exercise is an important factor for the overall well-being of UBC students, which in turn can affect their academic performance. Thus, UBC should be interested in the implications that this research has on their student life.

### Research Question

Is the likelihood for University of British Columbia (UBC) students to meet the Public Health Agency of Canada's (PHAC) recommended physical activity guideline of 150 minutes of moderate to strenuous exercise per week impacted by their commuting demands, course load and access to fitness facilities?

### Hypotheses

1. Students at UBC are not meeting the fitness guidelines recommended by PHAC.
2. Commuting demands, course load, and access to fitness facilities are all related to students' levels of physical exercise.

## Methods

### Participants

The sample consisted of 105 students (59 female, 45 male, 1 other) at the University of British Columbia. Our sample size includes students from a diverse range of faculties, with the majority of participants as undergraduate students, and two graduate students. See Table 1 for the sample size in comparison to UBC student body population.

### Conditions

For our analysis, results were divided into two groups: students who met the PHAC guidelines and students who did not. Specifically, the guidelines states that adults (aged 18-64) are required to stay active at least 150 minutes a week by focusing on moderate to vigorous aerobic exercises.

### Measures

*Amount of Physical Activity:* The present survey used the modified Godin-Leisure Time Exercise Questionnaire to measure students' amount of physical activity. The Godin-Leisure Time Exercise Questionnaire (Goldin & Shepard, 1997) is a validated questionnaire designed to assess exercise behavior. For the purpose of this study, our study modified the question: "Considering a 7-day period (a week) how many times on the average do you do the following kinds of exercise for more than 15 minutes during your free time?" to "Considering a 7-day period (a week), how many *minutes* on average do you spend on doing the following kinds of exercise? (Please only take into consideration of those exercise that last for at least 10 minutes)" to determine whether or not students have met the PHAC guideline. Participants were required to fill out the amount of time (in minutes) they approximately spend on strenuous (vigorous), moderate, and mild exercises on a weekly basis.

*Course Load:* A total of 3 questions were used to measure students' course load. The number of courses currently enrolled in; hours spent on studying, social activity, sleeping, and hours of free time per day; and a 5-point Likert scale ranging from never (1) to always (5) on how overwhelmed, busy, stressed, and productive students feel due to school work in the past two weeks.

*Commuting Demands:* Two questions were used to measure students' commuting demands. Students were asked their commute methods to school, and the time (in minutes) they spent commuting to and from school on a daily basis.

*Access to Fitness Facilities:* A total of 5 questions were used to measure student's access to fitness facilities. Students were asked their cost of attending fitness facilities per month and the travel time (in minutes) to fitness facilities. Students were also asked to respond on a 5-point Likert

scale on whether cost would prevent them from purchasing membership to a fitness class or facility, whether travelling distance prevents them from exercising, and the perceived enjoyableness of the fitness facility they attend.

*Subjective Attribution of Lack of Exercise:* on a 7-point Likert scale ranging from “Not at all” (1) to “Very much” (7), students were asked to rate how much they attribute their lack of exercise due to the following factors: course load, commuting demands, and access to fitness facilities.

See Appendix for a complete copy of the questionnaire.

### **Procedure**

The questionnaire for this study was created using Qualtrics, an online survey software. The surveys were distributed at the UBC Vancouver campus anytime of the day from mid-March to early-April by iPads. Participants were recruited by convenience sampling at Irving K. Barber Building, the Student Union Building, Tim Hortons/Qoola, and other miscellaneous buildings on campus. Students were asked to complete the voluntary and anonymous questionnaire on the topic of objective and subjective barriers to exercise. Consent for participation was obtained prior to survey. Participants were required to fill out basic demographic information (gender, faculty, major, and year standing). After that, participants were required to answer a total of 12 questions. No compensation was given upon completion.

### **Results**

In relation to our first hypothesis, a binomial test revealed that significantly more individuals ( $n = 68/ 65\%$ ,  $p = .003$ ) in our sample did not meet the physical fitness guideline proposed by PHAC. In other words, only roughly a third of our sample ( $n = 37/ 35\%$ ) met the fitness guidelines. In addition, there seems to be a comparable number of males ( $n = 17$ ) and females ( $n = 19$ ) who met the fitness guidelines. In contrast, there are more females ( $n = 40$ ) than males ( $n = 28$ ) who did not meet the fitness guidelines. A chi-square test revealed that such differences in gender was not significant,  $\chi^2(2, 105) = 2.20$ ,  $p = 0.33$ .

For our second hypothesis, we measured both the subjective and objective correlations between our three independent variables – commuting demands, course load, and access to fitness facilities and our dependent variable – the amount of physical exercise. For subjective correlations, we measured how much participants attribute their lack of exercise to the fore-mentioned three factors on a 7 point-Likert scale (1= not at all, 7 = very much). For objective correlations, we operationalized those three variables into 1) number of courses/time spent on studying; 2) commuting time/method; 3) the cost/distance and enjoyableness of fitness facilities that one frequently attend to. In the current analysis, unless otherwise specified, physical exercise time refers to the time people spent on doing strenuous and moderate exercises, in accordance to the fitness guideline proposed by PHAC.

#### **Subjective correlations**

A one-sample t-test analysis (comparing the means to the neutral value 4) revealed that participants significantly subjectively attribute course load to their lack of exercise,  $M = 5.10$ ,  $SD = 1.74$ ,  $t(104) = 6.47$ ,  $p = .000$ . 95% CI [4.76, 7.63]. In contrast, the other two factors- commuting demand ( $M = 3.55$ ,  $SD = 1.82$ ,  $t(104) = -2.52$ ,  $p = .013$ ) and access to fitness facilities ( $M = 3.35$ ,  $SD = 1.77$ ,  $t(104) = -3.75$ ,  $p = .000$ ) are rated significantly lower than the neutral value-4, suggesting that they don't attribute such factors as primary reasons for their lack of exercise.

### **Commuting demands**

For our first independent variable of commuting demands, the time participants spend on commuting is not significantly correlated with their physical exercise level ( $r = .151, p = .132$ ). Additionally, there is still no significant correlation between the commute time and physical exercise level ( $r = .234, p = .127$ ) for those who selected “*bike*” or “*walk*” ( $n = 44$ ) as their only commuting method, although we would assume these methods imply more exercise time.

### **Course load**

When examining course load we excluded two Masters students from the subsequent analyses on the relationships between course load and exercise. This is because the course load of a master student is dramatically different from the majority of undergraduate students, who are the focus of our research. In order to get an objective sense of student course load we measured their number of courses that they are currently enrolled in. We also measured their self-reported time spent on studying, social activities, sleeping and leisure per day. On average, participants reported spending 4.88 hours studying ( $M = 4.88, SD = 3.35$ ), 7.38 hours sleeping ( $M = 7.38, SD = 1.34$ ), 3.17 hours participating in social activities ( $M = 3.17, SD = 2.36$ ) and 3.18 hours on leisure activities ( $M = 3.18, SD = 2.80$ ). We found no significant correlation between the number of courses one is taking and one's exercise level ( $r = .034, p = .739$ ); nor did we find a significant correlation between the time one spent on studying per day and exercise level ( $r = -.089, p = .380$ ). Time spent on social activities ( $r = -.062, p = .542$ ) and other leisure activities ( $r = -.179, r = .076$ ) also did not correlate with exercise time. Not surprisingly, the time people spent on sleeping ( $r = -.286, p = .004$ ) and leisure time ( $r = -.260, p = .009$ ) is significantly and negatively correlated with the time people spent on studying. In addition, we also found a significant correlation between time spent on sleeping and one's leisure time ( $r = -.257, p = .009$ ).

Furthermore, in order to assess each participants' subjective perception of their course load amount and difficulty, we measured the frequencies they felt overwhelmed, stressed, busy and productive during the past two week on a 5-point Likert scale (1 = never, 5 = always). On average, participants reported being overwhelmed ( $M = 3.38, SD = 0.94$ ), stressed ( $M = 3.55, SD = 0.92$ ) and busy ( $M = 3.90, SD = 0.84$ ) frequently. However, this could be due to the time of the year (i.e., end of the school term) that we collected our data. None of these subjective feelings significantly correlated with one's exercise level. However, we did find that the frequencies of feeling overwhelmed is positively and strongly correlated with the frequencies of feeling busy ( $r = .660, p = .000$ ), and the frequencies of feeling stressed ( $r = .737, p = .000$ ). Feeling busy is also moderately correlated with feelings of stress ( $r = .546, p = .000$ ). Interestingly, the frequencies of feeling busy is positively correlated with the frequencies of feeling productive ( $r = .262, p = .008$ ).

### **Access to fitness facilities**

Our third variable of interest is access to fitness facilities. We measured the objective and subject cost, distance and the subjective enjoyableness of attending fitness facilities and their correlations with physical exercise. First, for the cost, results revealed that 42.90% ( $n = 45$ ) of our participants only attend free fitness facilities. The cost of attending fitness facilities is not significantly correlated with one's physical activities level (strenuous + moderate) that is associated with the fitness guidelines ( $r = .174, p = .078$ ); however it is significantly positively correlated with one's total exercise time (strenuous + moderate + mild),  $r = .205, p = .038$ . Furthermore, after dividing participants into two groups – those who met the fitness guideline

and those who do not, a significant correlation between cost and total exercise time still exists among those who meet the fitness guideline ( $r = .346, p = .036$ ).

Subjectively, approximately one-third of our sample ( $n = 36, 34.28\%$ ) indicated that they sometimes wanted to buy a membership to a fitness class/facilities but decided not to because of how much it costs. However, the subjective feeling of wanting to attend a fitness facilities but deciding not to because of its cost is not significantly correlated with one's exercise level ( $r = -.015, p = .88$ ).

Secondly, for the distance of fitness facilities, we relied on the time participants needed to get to their fitness facilities to indicate the distance they have to travel. Above half of the sample ( $n = 62, 59\%$ ) indicated that it usually takes less than 15 minutes to get to their fitness facilities. The time used to get to those fitness facilities is not significantly correlated with one's physical exercise level ( $r = -.026, p = .797$ ); neither did their answers on the question "*Have you ever wanted to exercise but decided not to because of the distance you would have to travel?*" significantly correlated with their physical exercise level ( $r = -.005, p = .963$ ).

Finally, the enjoyableness of the fitness facilities they usually attend is not significantly correlated with their physical exercise level ( $r = .132, p = .183$ ).

### **Summary**

While none of our variables in interest are significantly correlated with physical exercise (strenuous + moderate), the cost of attending fitness facilities is significantly positively correlated with one's total exercise time (strenuous + moderate + mild).

In addition, a multiple regression analysis, presented in Table 2, indicated that only the cost of attending fitness facilities significantly predicted one's total physical exercise, i.e., strenuous, moderate and mild exercise time ( $\beta = .204, SE = 28.58, p = .049$ ).

### **Discussion**

In line with our first hypothesis, results revealed that the majority of student at UBC are not meeting the physical activity guidelines set forth by PHAC. This has serious implications as physical inactivity has been associated with adverse health consequences (e.g., heart disease and obesity). Additionally, physical inactivity in early adulthood had been found to be predictive of inactivity later in life (Dohle & Wansink, 2013). Therefore, physical inactivity in early adulthood is a serious problem as it is predictive unhealthy lifestyle later in life.

By looking at both objective and subjective measures, we could see if there was a discrepancy between what students perceived to be barriers to exercise and what were actual barriers to exercise. Our subjective measures revealed that students perceive course load as a barrier to exercise significantly more so than commuting demands and access to fitness facilities. Interestingly, the correlation between course load and physical activity did not exist in the objective measures. This suggests that students are overestimating how much course load influences their exercise. Students may be using course load as an excuse for physical inactivity which may promote further inactivity. Only one significant correlation was found when we examined our objective measures. The cost of fitness facilities was positively correlated with level of exercise. Since this study is correlational, there are several ways to interpret these results. One possibility could be that only students who are serious about physical activity buy fitness passes and pay higher costs to attend fitness facilities. A second possibility could be that having a fitness pass provides people with an external motivator to work out, such as not wanting to waste the money they spent on buying the fitness pass.

There are several limitations to our study that should be considered when interpreting our results. To begin, many of our survey questions used an ordinal scale. For example, the question on commuting demands asks, "*How many minutes does it take for you to get to and go home from school/class each day (adding up both ways)?*" Participants had to choose between five options: 0-15mins, 15-30mins, 30-60mins, 60-120mins, or more than 120 minutes. A similar scale was used for travel time to fitness facilities and cost of fitness facilities. If we were to redo this study, it would be beneficial to use a ratio scales instead, since participants could then type in the values that reflected the exact amount of time they spend commuting or the exact amount of money they pay to attend fitness facilities. A ratio scale is a more precise and sensitive measure and perhaps other significant correlations could be detected. Another limitation of the study is that the sample size was relatively small. It would be beneficial to increase the sample size to increase the power to detect correlations between exercise and our three predictor variables. Additionally, all of our data was collected from mid to late March. Many exams are scheduled around this time and therefore students may have been under increased levels of stress. This could lead them to be less physically active than they usually are as well as make them less motivated to take the time to thoughtfully complete our survey.

Although there are limitations to our design, our finding still provide us with important implications. Firstly they suggest that students are not meeting the fitness guidelines set forth by PHAC. Secondly they suggest that students perceive course load to be a barrier to their physical activity, but that the correlation between course load and exercise is non-existent when you look at their relationship on objective measures. This could be suggesting that students use course load as an excuse of physical inactivity. This may have serious implications because students may be rationalizing their inactivity and this may give way to maintenance of unhealthy habits. Finally, our study has revealed a relationship between the cost of fitness facilities and exercise. This has implications as it may be implying that students need external motivators to promote physical activity. If this is the case then it could be beneficial for UBC to reward physically fit students in some way.

Although our research was conducted at UBC, these findings can generalize to university students world-wide. While the primary focus of university is academic, physical activity is an important factor in maintaining well-being. Past studies have found a positive relationship between students' physical exercise and grade-point average (Trockle, Barnes, & Eggget, 2000).

From our findings we have developed a few recommendations for UBC. We recommend that UBC encourage physical activity through the use of descriptive norms. Descriptive norms have been shown to be effective in influencing people's behaviours. For example, Goldstein and colleagues (2008) found that descriptive norms could be effectively used to increase towel re-usage in hotels. UBC could implement the use of descriptive norms by creating advertisements that would be placed around campus that showcase physically fit students at UBC. This may lead students to view physical activity and healthy lifestyles as normative at UBC and as a result encourage students to partake in healthy habits.

We also recommend that UBC reward physically active students in order to reinforce their good behaviour. Shultz et al. (2007) found that people were more likely to maintain low levels of energy consumption when their low energy usage was reinforced with a smiley face emoticon. We suggest that UBC implement a program that will reward students who exercise, such as providing them small discounts on their purchases at UBC shops and food vendors when they present their fitness pass. This reinforces physical activity for students by providing positive feedback. Additionally, our findings suggest that there is a relationship between the cost of



fitness facilities and exercise, so if this program encouraged more students to buy fitness passes, they may be motivated to exercise more in order to not waste their money.

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Table 1  
*Sample Size in Relation to UBC Student Population*

	Sample		UBC	
	n	%	n	%
Arts	51	48.57	11,220	34.48
Science	20	19.05	7,459	22.92
Commerce	9	8.57	5,813	17.86
Engineering	3	2.86	4,341	13.34
Forestry	2	1.90	2,579	7.92
Fine arts	19	18.10	879	2.70

Table 2

*Multiple regression analyses predicting physical exercise from course load (number of courses currently taking); commuting time, and access to fitness facilities (cost, distance, enjoyableness).*

Predictors	Physical exercises			
	B	SE	$\beta$	<i>p</i>
Course Load	-8.92	29.96	-.29	.766
Commuting Time	26.78	34.03	.08	.433
Access to fitness facilities (cost)	56.95	28.60	.21*	.049
Access to fitness facilities (distance)	-13.95	49.50	-.29	.779
Access to fitness facilities (enjoyableness)	57.62	36.73	.16	.120

*Note: \* $p < .05$ , two-tailed*

## Appendix

### Complete Questionnaire as Administered Through Qualtrics

Considering a 7-day period (a week), how many minutes on average do you spend on doing the following kinds of exercise? (Please only take into consideration of those exercise that last for at least 10 minutes).

**Strenuous Exercise (Heart beats rapidly)**

E.g., Running, jogging, hockey, football, soccer, squash, basketball, cross country skiing, judo, roller skating, vigorous swimming, vigorous long distance bicycling)

**Moderate Exercise (Not exhausting)**

E.g., fast walking, baseball, tennis, easy bicycling, volleyball, badminton, easy swimming, alpine skiing, popular and folk dancing

**Mild Exercise (Minimal effort)**

E.g., yoga, archery, bowling, golf, easy walking

Total

How many classes are you currently enrolled in?

How do you get to school/class each day? (Check all that apply)

Walk

Bike

Drive

Public transport

Other, please specify:

How many minutes does it take for you to get to and go home from school/class each day (adding up both ways)?

Less than 15 mins

15-30 mins

30-60 mins

60-120 mins

More than 120 mins

How much does it usually cost you to attend to fitness facilities on a monthly basis?

I only go to free fitness facilities

1 - 15 dollars

15- 30 dollars

31- 60 dollars

More than 60 dollars

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Have you ever wanted to buy a membership to a fitness class or facility but decided not to because of how much it cost?

Never

Rarely

Sometimes

Often

All of the  
Time

How long does it usually take you to get to those fitness facilities?

0 - 15 mins

15 - 30 mins

30 - 60 mins

60 - 120 mins

More than 120 mins

Have you ever wanted to exercise but decided not to because of the distance you would have to travel to your nearest gym, running trail or fitness facility?

Never

Rarely

Sometimes

Often

All of the  
Time

On average how enjoyable do you find your experiences to be in the fitness facilities you frequently attend?

Very unenjoyable

Unenjoyable

Neutral

Enjoyable

Very enjoyable

Not applicable (I do not attend to any fitness facilities)

How much do you attribute your lack of exercise to the following factors?

	1 = Not at all	2	3	4 = Neutral	5	6	7 = Very Much
Commuting demands	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Course load	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Access of fitness facilities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please indicate how many hours you spend on the following activities per day. This is just to give us a sense of what a typical day will be like for you.

0      1.6      3.2      4.8      6.4      8      9.6      11.2      12.8      14.4      16

Studying (e.g., assignments, readings, studying for exams, etc)?

Social Activity

Sleep

Free time

Commuting

Exercise



How often do you experience these feelings in the past 2 weeks due to school work:

	Never	Rarely	Sometimes	Most of the Time	Always
Overwhelmed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Busy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Stressed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Productive	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>